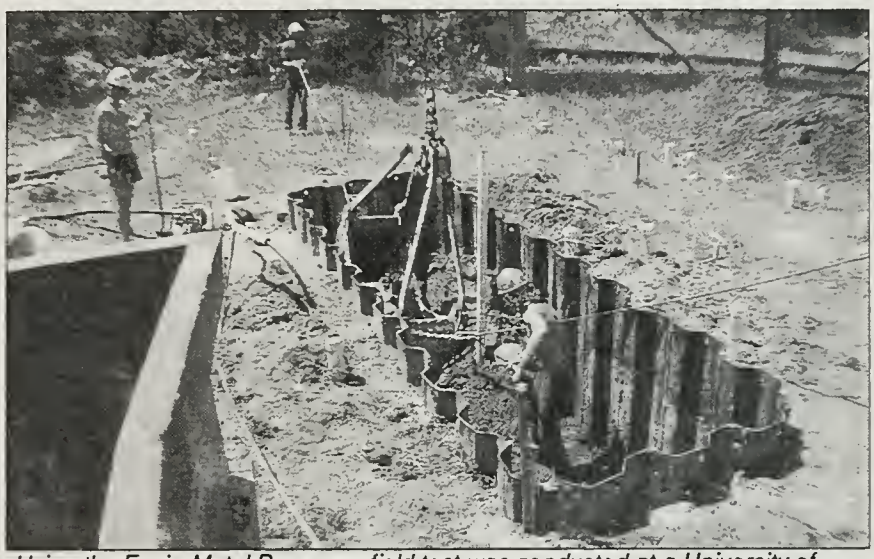
Ontario

Metal-enhanced Dechlorination Process

"The ETI process is particularly attractive because it is passive and can be used in situ for remediation of groundwater contaminated by chlorinated organic compounds. In order for this remarkable technology to achieve its potential, and in order for ETI to maintain its lead position in both fundamental and applied aspects of the technology, ETI is committed to advancing the technology, both through market development and support of the university research program."

Robert Gillham
President
EnviroMetal Technologies Inc.
Guelph, Ontario



Using the EnviroMetal Process a field test was conducted at a University of Waterloo field test site involving the installation of an in situ reactive wall. Once the reactive metal is placed in the excavation and the sheet piling removed, groundwater passes through the wall under naturally flowing conditions and contaminants in the groundwater are degraded.

THE COMPANY

EnviroMetal Technologies Inc. (ETI) was founded in 1992 to develop and market the metal-enhanced dechlorination process invented at the University of Waterloo. Results of demonstration tests prompted ETI to start actively marketing the technology in 1995.

Gross revenues for the development period were $500,000 per year, almost all of which came from international clients, primarily those in the U.S.

THE CHALLENGE

The U.S. has 300,000 to 400,000 hazardous waste sites. To date, conventional methods have not succeeded in cleaning up the contaminated groundwater. Although statistics are most readily available for the U.S., there is no question that similar problems exist in Canada and all other developed countries.

ETI's technology can be used on the class of compounds called chlorinated organics which are often found at these hazardous waste sites.

TECHNOLOGY DESCRIPTION

ETI's technology is based on the fact that metals - and especially iron - donate electrons for the reductive dechlorination of dissolved chlorinated organic compounds. That is to say, in a corrosion-type reaction, the iron is oxidized and the organic compound is reduced.

ETI has developed in situ or in place applications in which a permeable wall containing granular iron is installed across the path of a contaminated plume in the groundwater. The contaminants are destroyed when the water passes through the wall.

The technology is environmentally friendly on two counts. First, it is passive which saves water and energy and keeps operating and maintenance costs down. Second, one of its main components, the iron fillings, is a waste material which helps to conserve resources.

The first field demonstration unit was installed at an experimental site at Canadian Forces Base Borden in 1991. The initial concentrations of trichloroethylene at 270 milligrams per litre (mg/L) and tetrachloroethylene at 43 mg/L were high.

The installation removed about 90 per cent of the contaminants. With a thicker wall or a higher percentage of iron within the wall, the process probably could have removed all of the contaminants. Of particular importance, however, is the fact that this demonstration project has operated continuously for four years with no perceptible change in performance.

Two in situ demonstrations are now in progress in the United States, one in California and one in New York. In both cases the contaminants are removed completely by the reactive material. Though highly encouraging, the demonstrations need to go on longer to be considered unqualified successes.

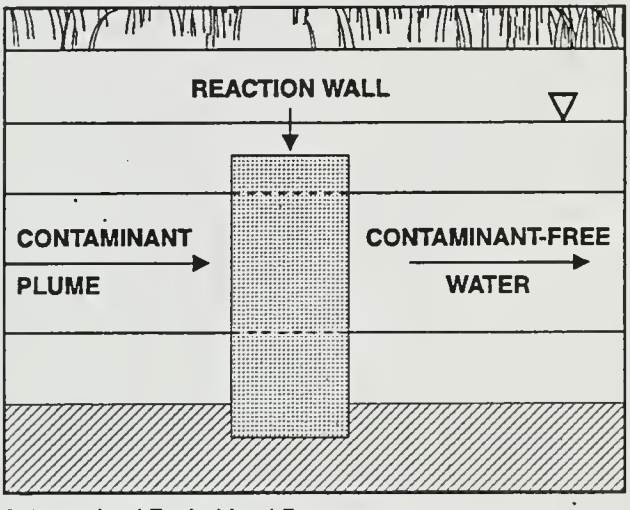
TECHNOLOGY OPPORTUNITIES

In the next 30 years, an estimated $750 billion will be spent cleaning up the groundwater at U.S. hazardous waste sites. Extrapolating this figure to the developed world, it would seem that there is an enormous market for ETI's technology.

At present, ETI's process is designed for in situ treatment of

groundwater. But the company is modifying the technology so that it can be used for treating contaminated groundwater above ground as well as for treating industrial wastewater streams. This would greatly increase the company's potential market.

The initial - and continuing - partnership in developing the technology involved the Waterloo Centre for Groundwater Research, the University of Waterloo and Beak Consultants Ltd. These organizations are active participants in and contributors to ETI. In addition, ETI has signed a co-operative agreement with the Corporate Research and Development Laboratory of General Electric and is currently engaged in discussions with a company in Germany.



Schematic of EnviroMetal Process.

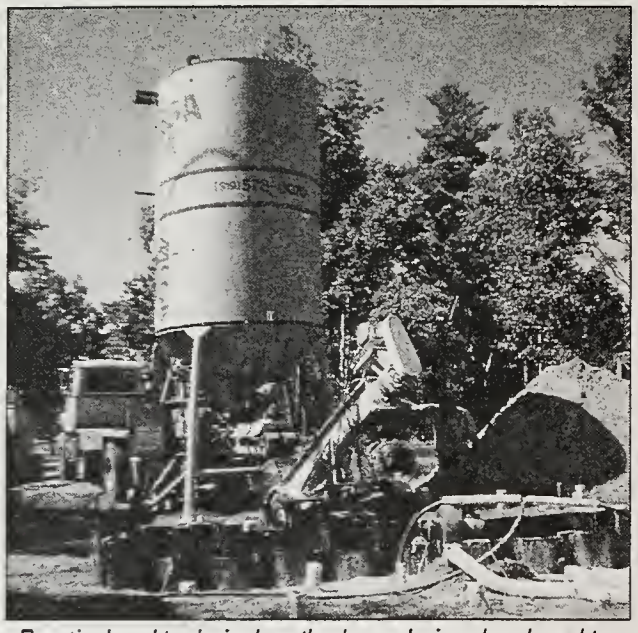
PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

The initial phase of the development of this technology was partially supported by the Ontario Ministry of Environment and Energy.

Industrial companies which are located in Ontario may seek ministry/industry services that will help them to:

- reduce, reuse and recycle solid waste;
- effectively remediate historic pollution and destroy hazardous contaminants;
- reduce or eliminate liquid effluent and gaseous emissions;
- use energy and water more efficiently.

Equipment and service supply companies can benefit from the information provided on technologies identified for business development.



Practical and technical methods are being developed to clean up groundwater contaminated by landfill leachate, gasoline spills and industrial chemical releases.

FOR FURTHER INFORMATION, PLEASE CONTACT:

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MINISTRY OF ENVIRONMENT AND ENERGY SERVICES

For information on Ministry of Environment and Energy assistance to industry, please contact the Industry Conservation Branch at (416) 327-1492, Fax (416) 327-1261

For more project profiles and other publications, visit the ministry's website at http://www.ene.gov.on.ca

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